

CLAIMS

1. An information processing apparatus for displaying on a display device an image reflected a motion of an operation article which is held and given the motion by an operator, said information processing apparatus comprising:

a stroboscope operable to emit light to the operation article which has a reflecting surface in a predetermined cycle;

10 an imaging unit operable to photograph the operation article with and without light emitted from said stroboscope and acquire a lighted image and an unlighted image;

a differential signal generating unit operable to generate a differential signal between the lighted image and the unlighted image;

15 a state information computing unit operable to compute state information of the operation article on the basis of the differential signal and generate a first trigger on the basis of the state information; and

20 an image display processing unit operable to display a first object representing a movement locus of the operation article in response to the first trigger on the display device.

2. An information processing apparatus for displaying an image on a display device on the basis of a result of detecting an operation article which is grasped and given a motion by an operator, said information processing apparatus comprising:

a stroboscope operable to emit light to the operation article which has a plurality of reflecting surfaces in a predetermined cycle;

30 an imaging unit operable to photograph the operation article with and without light emitted from said stroboscope and acquire a lighted image and an unlighted image;

a differential signal generating unit operable to generate a differential signal between the lighted image and the unlighted image;

35 a state information computing unit operable to compute state information of the operation article on the basis of the differential signal and determine which of the plurality of reflecting surfaces is photographed on the basis of the state information; and

an image display processing unit operable to display a different image on the display device depending on the determined reflecting surface.

3. The information processing apparatus as claimed in claim 2, wherein the state information includes any one of area information, number information, profile information, and ratio information 5 indicative of a profile, or a combination thereof about the reflecting surface.

4. An information processing apparatus for displaying an image on a display device on the basis of a result of detecting an operation 10 article which is grasped and given a motion by an operator, said information processing apparatus comprising:

a stroboscope operable emit light to the operation article which has a plurality of reflecting surfaces in a predetermined cycle;

15 an imaging unit operable to photograph the operation article with and without light emitted from said stroboscope and acquire a lighted image and an unlighted image;

a differential signal generating unit operable to generate a differential signal between the lighted image and the unlighted image;

20 a state information computing unit operable to compute state information of each of the reflecting surfaces on the basis of the differential signal; and

an image display processing unit operable to display an image on the display device in accordance with the state information of the plurality of reflecting surfaces.

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5. The information processing apparatus as claimed in claim 1, wherein the first object representing the movement locus comprises a beltlike object,

30 said image display processing unit is representative of the movement locus of the operation article by displaying the beltlike object on the display device so that a width varies for each frame, and

the width of the beltlike object increases as the frame is updated, and thereafter decreases as the frame is updated.

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6. The information processing apparatus as claimed in claim 5, wherein said image display processing unit displays a second object on the display device,

said state information computing unit generates a second trigger when positional relation between the second object and the first object representing the movement locus of the operation article meets a predetermined condition, and

5 said image display processing unit displays the second object given a predetermined effect on the display device in response to the second trigger.

10 7. The information processing apparatus as claimed in claim 1, wherein said state information computing unit computes positional information as the state information of the operation article after speed information as the state information of the operation article exceeds a predetermined first threshold value until the speed information becomes less than a predetermined second threshold value,

15 or computes the positional information of the operation article after the speed information of the operation article exceeds the predetermined first threshold value before the operation article deviates beyond the photographing range of said imaging unit, determines, when the positional information of the operation article

20 is obtained for three or more times, the appearance of the first object representing the movement locus of the operation article on the basis of the first positional information of the operation article and the last positional information of the operation article, and generates, when the positional information of the operation article is

25 obtained for three or more times, the first trigger on the basis of the state information.

30 8. The information processing apparatus as claimed in claim 1, wherein said state information computing unit computes area information as the state information of the operation article, and generates a third trigger when the area information exceeds a predetermined third threshold value, and

 said image display processing unit displays a third object on the display device in response to the third trigger.

35 9. The information processing apparatus as claimed in claim 1, wherein said image display processing unit displays a character string on the display device,

10 said state information computing unit generates a fourth trigger on the basis of the state information of the operation article, and

5 said image display processing unit displays a character string differing from the character string on the display device in response to the fourth trigger.

10. The information processing apparatus as claimed in claim 1, wherein said state information computing unit generates a fifth trigger on the basis of the state information of the operation article, and

15 said image display processing unit updates a background image in response to the fifth trigger.

15 11. The information processing apparatus as claimed in claim 1 further comprising a correction information acquisition unit operable to acquire correction information for correcting positional information as the state information of the operation article, and

20 said state information computing unit computes corrected positional information by using the correction information.

25 12. The information processing apparatus as claimed in claim 1, wherein said image display processing unit displays a cursor on the display device and moves the cursor in accordance with positional information as the state information of the operation article.

30 13. The information processing apparatus as claimed in claim 1, wherein execution of a predetermined process is fixed on the basis of the state information of the operation article.

35 14. The information processing apparatus as claimed in claim 12, wherein, when the cursor is displayed overlapping a fourth object, said image display processing unit displays an image associated with the fourth object on the display device.

15. The information processing apparatus as claimed in claim 12, wherein said image display processing unit displays a character selected by the cursor on the display device.

16. The information processing apparatus as claimed in claim 1, wherein said state information computing unit generates a sixth trigger on the basis of the state information of the operation article, and

5 said image display processing unit displays on the display device a fifth object corresponding to the motion of the operation article in response to the sixth trigger.

10 17. The information processing apparatus as claimed in claim 1, wherein said image display processing unit displays the first object representing the movement locus of the operation article on the display device after a lapse of a predetermined time from a generation of the first trigger.

15 18. The information processing apparatus as claimed in claim 1, wherein said image display processing unit displays a sixth object on the display device when the state information obtained successively of the operation article meets a predetermined condition.

20 19. The information processing apparatus as claimed in claim 1, wherein said image display processing unit displays on the display device a guide which instructs an operation direction and operation timing of the operation article.

25 20. The information processing apparatus as claimed in claim 1, the state information includes one or a combination of two or more selected from speed information, moving direction information, moving distance information, velocity vector information, acceleration information, movement locus information, area information, and 30 positional information.

21. The information processing apparatus as claimed in claim 1 further comprising a sound effect generating unit operable to output a sound effect through a speaker in response to the first trigger.

35 22. An information processing system comprising:
 an operation article having a reflecting surface, wherein said operation article is grasped and given a motion by an operator;

5 a stroboscope operable to emit light to said operation article in a predetermined cycle;

10 an imaging unit operable to photograph said operation article with and without light emitted from said stroboscope and acquire a lighted image and an unlighted image;

15 a differential signal generating unit operable to generate a differential signal between the lighted image and the unlighted image;

20 a state information computing unit operable to compute state information of said operation article on the basis of the differential signal and generate a first trigger on the basis of the state information; and

25 an image display processing unit operable to display a first object representing a movement locus of the operation article in response to the first trigger on the display device.

30 15 23. An information processing system comprising:
an operation article having a plurality of reflecting surfaces, wherein said operation article is grasped and given a motion by an operator;

35 20 a stroboscope operable to emit light to said operation article in a predetermined cycle;

40 an imaging unit operable to photograph said operation article with and without light emitted from said stroboscope and acquire a lighted image and an unlighted image;

45 25 a differential signal generating unit operable to generate a differential signal between the lighted image and the unlighted image;

50 a state information computing unit operable to compute state information of the operation article on the basis of the differential signal and determine which of the plurality of reflecting surfaces is photographed on the basis of the state information; and

55 30 an image display processing unit operable to display a different image on the display device depending on the determined reflecting surface.

60 35 24. An information processing system comprising:
an operation article having a plurality of reflecting surfaces, wherein said operation article is grasped and given a motion by an operator;

a stroboscope operable to emit light to said operation article in a predetermined cycle;

5 an imaging unit operable to photograph said operation article with and without light emitted from said stroboscope and acquire a lighted image and an unlighted image;

a differential signal generating unit operable to generate a differential signal between the lighted image and the unlighted image;

10 a state information computing unit operable to compute state information of each of the reflecting surfaces on the basis of the differential signal; and

an image display processing unit operable to display an image on the display device in accordance with the state information of the plurality of reflecting surfaces.

15 25. An operation article which is operated by the operator of the information processing apparatus as set forth in claim 2,

wherein said operation article is provided with a plurality of different reflecting surfaces.

20 26. An information processing method of displaying on a display device an image reflected a motion of an operation article which is grasped and given the motion by an operator, said information processing method comprising:

25 a step of emitting light to the operation article which has a reflecting surface in a predetermined cycle;

a step of photographing the operation article with and without light emitted from said stroboscope and acquiring a lighted image and an unlighted image;

30 a step of generating a differential signal between the lighted image and the unlighted image;

a step of computing state information of the operation article on the basis of the differential signal and generating a first trigger on the basis of the state information; and

35 a step of displaying a first object representing a movement locus of the operation article in response to the first trigger on the display device.

27. An information processing method of displaying an image on a display device on the basis of a result of detecting an operation

article which is grasped and given a motion by an operator, said information processing method comprising:

a step of emitting light to the operation article which has a plurality of reflecting surfaces in a predetermined cycle;

5 a step of photographing the operation article with and without light emitted from said stroboscope and acquire a lighted image and an unlighted image;

a step of generating a differential signal between the lighted image and the unlighted image;

10 a step of computing state information of the operation article on the basis of the differential signal and determining which of the plurality of reflecting surfaces is photographed on the basis of the state information; and

15 a step of displaying a different image on the display device depending on the determined reflecting surface.

28. An information processing method of displaying an image on a display device on the basis of a result of detecting an operation article which is grasped and given a motion by an operator, said information processing method comprising:

a step of emitting light to the operation article which has a plurality of reflecting surfaces in a predetermined cycle;

25 a step of photographing the operation article with and without light emitted from said stroboscope and acquiring a lighted image and an unlighted image;

a step of generating a differential signal between the lighted image and the unlighted image;

a step of computing state information of each of the reflecting surfaces on the basis of the differential signal; and

30 a step of displaying an image on the display device in accordance with the state information of the plurality of reflecting surfaces.

29. An information processing program which is installed on a computer for displaying on a display device an image reflecting a motion of an operation article which is grasped and given the motion by an operator, said information processing program comprising:

a step of emitting light to the operation article which has a reflecting surface in a predetermined cycle;

a step of photographing the operation article with and without light emitted from said stroboscope and acquiring a lighted image and an unlighted image;

5 a step of generating a differential signal between the lighted image and the unlighted image;

a step of computing state information of the operation article on the basis of the differential signal and generating a first trigger on the basis of the state information; and

10 a step of displaying a first object representing a movement locus of the operation article in response to the first trigger on the display device.

15 30. An information processing program which is installed on a computer for displaying an image on a display device on the basis of a result of detecting an operation article which is grasped and given a motion by an operator, said information processing program comprising:

a step of emitting light to the operation article which has a plurality of reflecting surfaces in a predetermined cycle;

20 a step of photographing the operation article with and without light emitted from said stroboscope and acquire a lighted image and an unlighted image;

a step of generating a differential signal between the lighted image and the unlighted image;

25 a step of computing state information of the operation article on the basis of the differential signal and determining which of the plurality of reflecting surfaces is photographed on the basis of the state information; and

a step of displaying a different image on the display device depending on the determined reflecting surface.

30 31. An information processing program which is installed on a computer for displaying an image on a display device on the basis of a result of detecting an operation article which is grasped and given a motion by an operator, said information processing program comprising:

35 a step of emitting light to the operation article which has a plurality of reflecting surfaces in a predetermined cycle;

a step of photographing the operation article with and without light emitted from said stroboscope and acquiring a lighted image and an unlighted image;

5 a step of generating a differential signal between the lighted image and the unlighted image;

10 a step of computing state information of each of the reflecting surfaces on the basis of the differential signal; and

15 a step of displaying an image in accordance with the state information of the plurality of reflecting surfaces.

32. A game system for playing a game comprising:

10 an operation article actually operated by an operator;

15 an image sensor operable to photograph said operation article operated by the operator; and

20 a processing device which is connected to a display device when playing the game, receives an image signal from said image sensor and displays contents of the game on the display device,

25 wherein said operation article serves a prescribed role in the game on the basis of a image of said operation article photographed by said image sensor,

30 a movement locus of said operation article is simplified as a beltlike image in the contents displayed on the display device by said processing device when playing the game,

35 the beltlike image is a connection between at least two points of a movement locus of said operation article operated by the operator, and the at least two points which is displayed on the display device are obtained in accordance with images given by said image sensor.